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Investigation and Analysis Report

LOWER SILVER CREEK WATERSHED

Santa Clara County, California

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INVESTIGATION AND ANALYSIS REPORT

LOWER SILVER CREEK WATERSHED

Santa Clara County, California

Lead Agency: USDA Soil Conservation Service

Local Sponsors: Evergreen Resource Conservation District

Santa Clara Valley Water District

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RATIONALE FOR FORMULATION

Determination of Without Project Conditions

The without project condition is the land use and related conditions likely to occur under existing improvements, laws, and policies. Listed below are four significant groups of assumptions inherent in this definition.

Existing and Authorized Land Use Plans: From a land use perspective, the most likely future without project land use in the watershed was assumed to be that called for under Santa Clara County's General Plan for 1990 (as amended).

The flood plain area is already about 95 percent developed (urban). An inventory of the existing structures in the floodplain showed that 90 percent of them were between one and 30 years old and the other 10 percent between 30 and 50 years old. The economic life of buildings in the area cannot be documented because most development in the area is relatively new. However, because of the extremely high cost of housing in the area, the lack of developable land, quality of construction, and the mild climate, it was assumed that the existing structures would remain in use throughout the 100-year planning period. Observations made during the inventory process indicated that the older buildings in the flood plain were well kept and repaired rather than torn down or abandoned.

Undeveloped drainage areas contributing to the flood plain were assumed to be developed according to the land use element of the county general plan. An analysis was performed to determine the impact on the formulation and

selection process should this assumption prove erroneous. The results of this analysis indicated that the runoff contributing to the flood plain and the resulting damages would remain essentially the same should these areas not develop. This is because the water conveyance systems that would be installed should these areas develop would not be able to carry the runoff from larger storms and local ponding would occur on the developing sites. During smaller storms, when the water conveyance systems could accomodate the slight increase in runoff, so also could the existing Lower Silver Creek channel. The damages and benefits reported in the watershed plan/EIS result from the larger, more infrequent storms. Therefore, the effect of an erroneous assumption on land use development would not affect project formulation, feasibility, identification of the NED plan, or plan selection.

A draft "position paper" summarizing the land use assumptions used in evaluating the with and without project conditions was developed by SCS and distributed to representatives of the Santa Clara Valley Water District (SCVWD), the Evergreen Resource Conservation District (ERCD), and the city of San Jose for review and comments. The paper was formalized after comments were received. It was the above assumptions that were then used in the evaluation.

Existing and Authorized Flood Reduction Plans: Representatives of SCVWD, the city of San Jose, and the U.S. Army Corps of Engineers were contacted to obtain existing and proposed flood hazard reduction plans for the area. The SCVWD reported that corrective flood control measures will be implemented on nearby Penitencia Creek that would have an impact on the FWOP damages in the Lower Silver Creek flood plain.

The SCVWD reported that these measures would be installed prior to installation of the Lower Silver Creek flood control project. Therefore, the without-project scenario for Lower Silver Creek assumes these measures to be installed. The city and the Corps indicated that they have no plan(s) that have a high probability of being constructed in the area that would have an effect on Lower Silver Creek.

Flood Disaster Protection Act: The adoption and enforcement of land use regulations pursuant to the Flood Disaster Protection Act of 1973 was assumed.

Flood Plain Managment Guidelines: The adoption and enforcement of the Water Resource Council (WRC) Flood Plain Management Guidelines for implementing Executive Orders 11988 and 11990 (Flood Plain Manangement, and Protection of Wetlands) was assumed.

Other Assumptions: It was assumed that individual landowners would not install their own flood hazard reduction measures to protect against the larger, more infrequent storms that cause the significant damages. This assumption was based on the high cost of installing such measures. Another consideration was that the high percentage of renters and low income people residing in the flooded areas would not have the initiative and/or financial resources to assume such an expensive task.

The future without project conditions were based on watershed conditions that are expected to exist in the year 1990, the year in which project installation is scheduled to be completed. No land use projections were made beyond 1990.

Selection of Combinations of Measures in Alternative Plans

Plan 1--Nonstructural Flood Plain Protection: The nonstructural plan was developed by first reviewing the flood plain to determine if any minor structural alterations in the channel could be made to appreciably reduce damages. This possibility did not exist as the flooding problems were due to insufficient channel capacity rather than to "bottleneck" type constrictions along the channel. Therefore, formulation began on a totally nonstructural plan.

Zoning of the flood plain would not reduce damages or the potential for damages since the flood plain is 95 percent developed. The remaining 5 percent of the area, still to be developed, would be protected by a combination of existing zoning and FIA regulations. Therefore, this method was discarded. Purchases or acquisition of flood plain land were economically infeasible and impractical due to the unavailability of developable land in the area. Land costs range from $3.00 per square foot for residential lots to $7.00 per square foot for commercial lots. The average home is valued at $55,000, excluding the lot.

Relocation of existing homes were feasible on a limited number of homes so this option was retained. Floodproofing measures such as elevating homes, building floodwalls or dikes around properites, and applying waterproof sealant appeared to offer the most potential. A flood warning system was deemed necessary in combination with other measures, but was not analyzed independently.

Economic and engineering evaluation procedures for selecting combinations of measures for the nonstructural plan assumed that groups of homes would be evaluated as units. This assumption was used because of the following reasons:

1. The large number of homes involved.
2. The large number of groups of "tract" homes having similar characteristics.
3. The unacceptability of not floodproofing every home on a street when all would be flooded. This is especially true where some of the homes would fail the test of economic feasibilty by very small amounts.

Therefore, homes were grouped or "zoned" by the economist and engineer. The criteria used in grouping the homes was as follows:

1. The type of construction, i.e., slab versus foundation constructed home and wood versus stucco versus brick siding.
2. The value of the homes and the contents.
3. The depth of flooding (sometimes referred to as degree of risk).
4. The size of homes.
5. Whether the home had an attached or detached garage.

Applying these criteria, the 3,420 homes in the 100-year flood plain were grouped into 50 zones. Damages for each zone were then calculated by the economist using the SCS Urban 1 computer program. Average annual benefits for each zone for three different levels of protection were computed. This

information was given to the engineer who then developed costs for flood-proofing homes in each zone for three levels of protection. The depth of flooding served as the key criteria for selecting the type of nonstructural measure that was required. Average annual costs were then compared to the benefits that would be realized. Those zones with a favorable benefit to cost ratio were retained. Zones having a benefit to cost ratio less than 1:1 were eliminated from consideration.

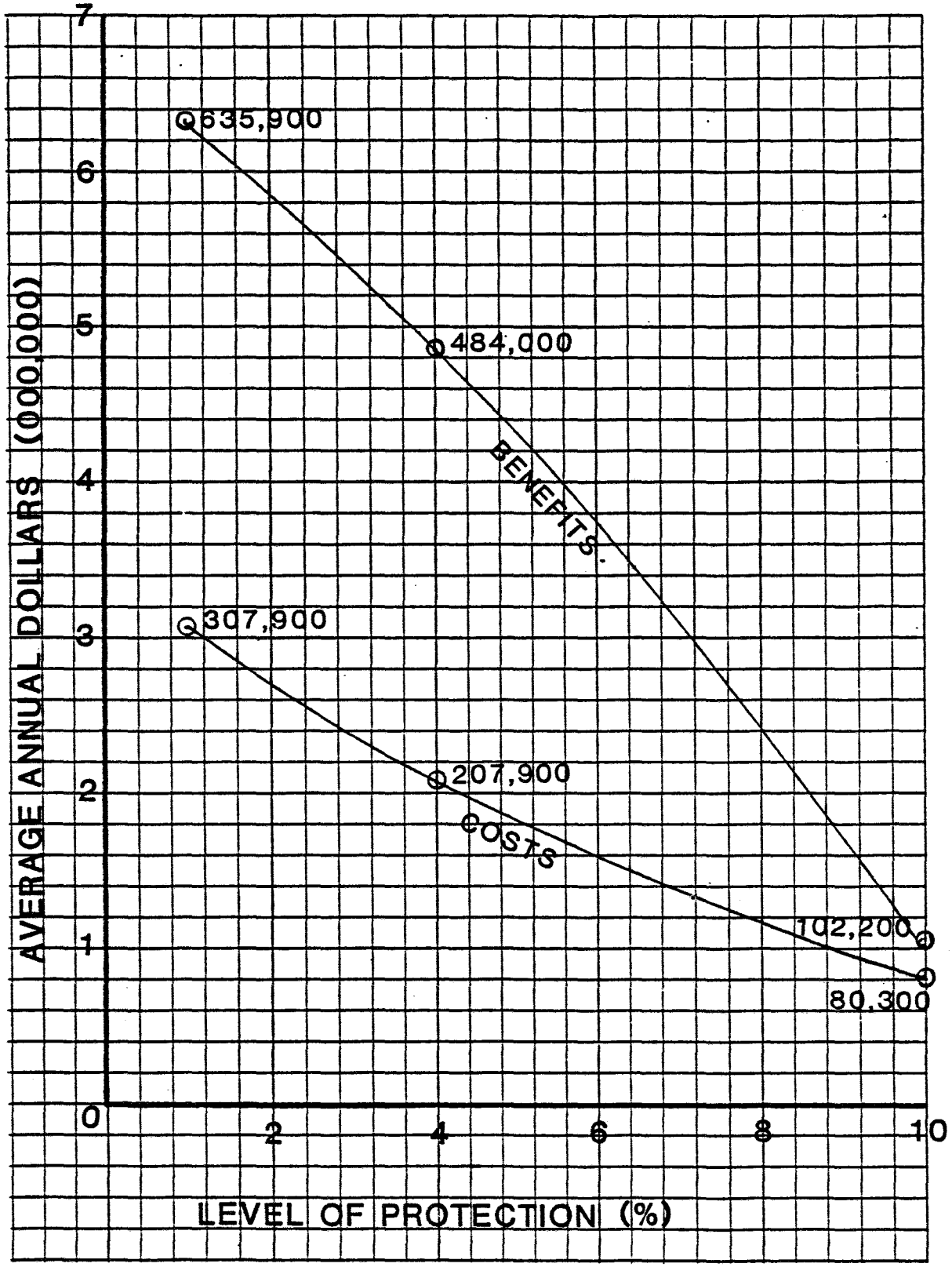
The 367 apartment, commercial, industrial, church, and school buildings were designed and evaluated on an individual basis for the same three levels of protection. Those having a favorable B/C ratio were retained and the others were discarded.

Cost and benefit curves for the three levels of protection evaluated appear in Table 1 (See Appendix B for summary of scaling process for Plan 1). It should be noted that the net benefits are highest at the 100-year level of protection. As a result, this is the plan that is displayed in the watershed plan/EIS. Reference should be made to the watershed plan/EIS for additional details concerning this plan.

Table 1

Nonstructural Plan

Benefit and Cost Curves[1/] used to Identify the Level of Protection Which Maximizes Net Benefits



1/ Costs do not include interest during construction

Plan 2--Channel Work and Floodproofing (NED Plan): Formulation for this alternative plan began by developing the costs and benefits of providing various levels of protection through various channel enlargement schemes. The three levels of protection selected for analysis were the 25-year, 50-year, and 100-year storm events. The hydrologist provided the economist with flow data, by channel reaches, for the three different size channels.

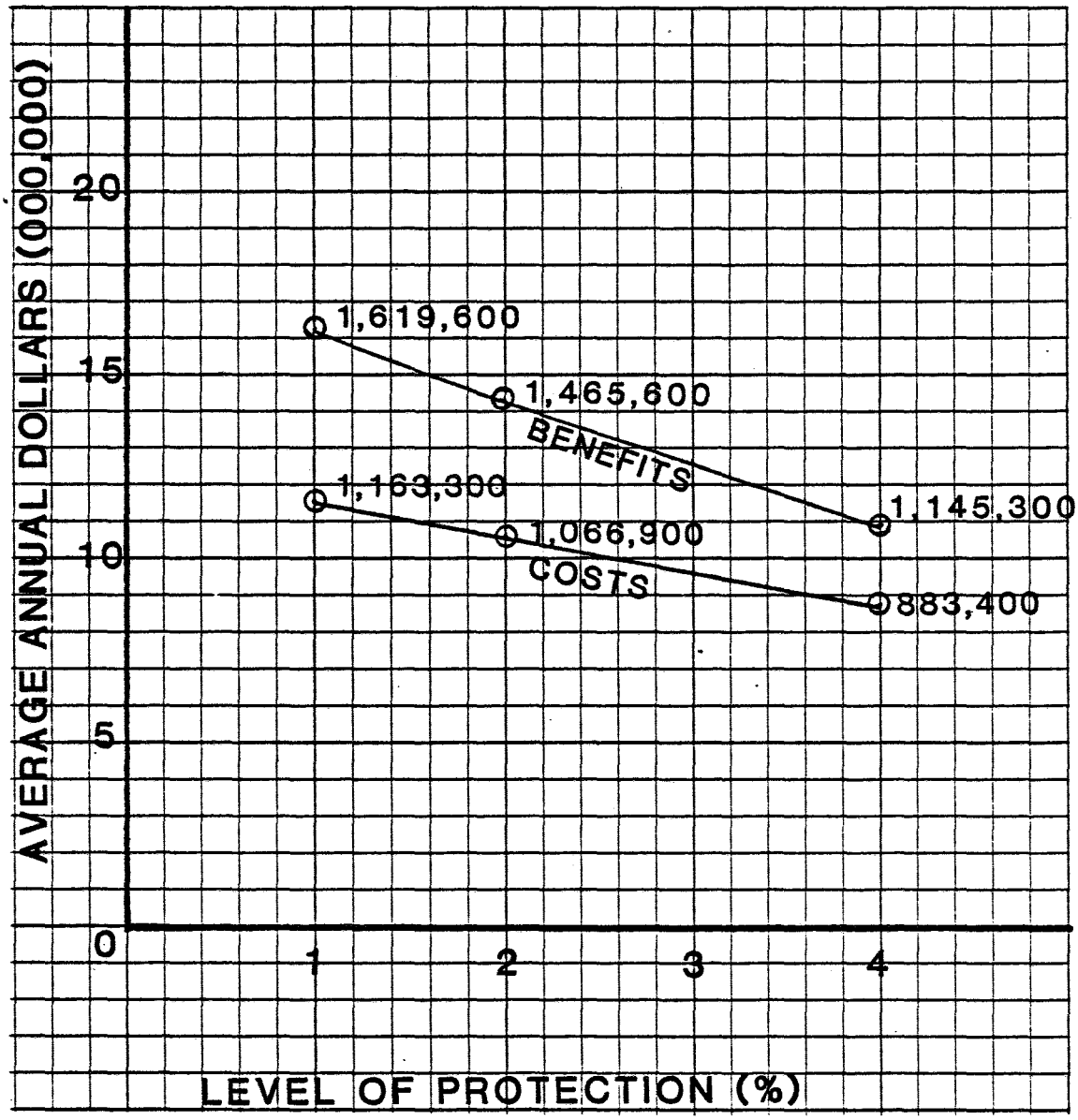
The economist entered this data into the SCS Urban 1 computer model to obtain residual damages under the three different channel sizes. Benefits (reduction of damages to buildings) were determined by subtracting the "with" channel damages from the "without" project damages. This procedure accounted for the largest category of benefits. Other benefits such as reducing sediment clean-up costs, automobile damages, emergency services costs, and traffic disruptions were also calculated. These benefit categories will be discussed later.

Once the total benefits were computed for each size channel they were plotted on graph paper along with the annual cost of providing the protection (construction, operation, and maintenance of the channel). Table 2 depicts the results of this evaluation.

Table 2

Channel Enlargement Plan

Benefit and Cost Curves[1/] used to Identify the Level of Protection Which Maximizes Net Benefits



1/ Costs do not include interest during construction

As the table indicates, benefits are maximized at the 100-year level of protection (See Appendix B for summary of scaling process for Plan 2).

The next step in the process was to evaluate the residual flooding situation with the channel installed as the first increment. One-hundred forty-two buildings remained flooded with the channel installed. Following the procedures outlined in Plan 1, these buildings were evaluated to determine if it was economically feasible to floodproof them. Only two buildings qualified, and only at the one percent level of protection. It was not economically feasible to floodproof the other buildings at any level of protection.

It should be noted why the channel work measure was evaluated as the first increment and the nonstructural measures were evaluated as the second increment. The rationale for this was that the channel work measure produced more net benefits, $456,300 1/ to $328,000 2/, than the "best" nonstructural plan (Plan 1).

1/ Does not include interest during construction. Net benefits are $358,300 including interest during construction.

2/ Does not include interest during construction. Net benefits are $307,100 including interest during construction.

Procedure Used to Measure Environmental and Economic Values for With Project Conditions for each Alternative

Economic: A thorough discussion of how economic values were measured is contained in the National Economic Development section of this reports under Benefits.

Environmental: The nonstructural alternative (Plan 1) was judged not to have any environmental consequences except to the aesthetics of the buildings protected under this plan. Because of this a detailed environmental evaluation was not conducted.

The channel work and nonstructural alternative (Plan 2) were carefully evaluated to determine any environmental impacts. An evaluation system similiar to the USFWS's Habitat Evaluation Procedures was employed. The without project habitat along the channel was assigned a value from 0 to 1.0 with 1.0 representing the best habitat. This habitat quality value was multiplied by the number of acres involved to determine total Habitat Units (HU).

Under the with project condition, the anticipated habitat along the channel was evaluated using the same procedures. The difference between without project HU's and with project HU's measured the biological impacts and determined mitigation needs.

The rating values used in this evaluation were determined by an interagency team made up of biologists from SCS, California Department of Fish and Game, and Santa Clara Valley Water District. The USFWS was invited to participate but declined due to budget limitations.

Incremental Analysis of NED Plan: Table 3 displays the information on incremental analysis.

Table 3

INCREMENTAL ANALYSIS OF NED PLAN

	Annual Costs		Annual Benefits		
Description of Increment	Incremental Cost	Total Cost	Incremental Benefit	Total Benefit	Net Benefits
Channel Work	$1,261,400	$1,261,400	$1,619,600	$1,619,600	$358,200
Nonstructural	1,200	1,262,600	3,200	1,622,800	360,200

Problems

Flooding: A thorough description of the flooding problems is presented in the watershed plan/EIS (see Problem and Opportunity Identification section). The following tables supplement and/or summarize the data contained in ~~the~~ that report.

Table 4

Number of Structures in Flood Plain Without Project

	Time Period				
Property Type	Existing	1990 (Po) 1/	2000	2030	2090
Residential					
Houses	3,420	3,420	3,420	3,420	3,420
Apartments	141	141	141	141	141
Commercial	155	155	155	155	155
Industrial	34	34	34	34	34
Schools and Churches	37	37	37	37	37

1/ The designation Po refers to the beginning of the evaluation period.

Note: Table is the same for both alternatives.

Table 5
Flood Damages by Decade Without Project
Applicable Discount Rate: 7-7/8%

Property Type	Time Period					
	1972 (P-10) 1/ Existing	1990 (Po) 1/	2000	2030	2090	AAE 2/
Residential						
Houses	3/	$ 828,500	$ 847,400	$ 907,700	$1,151,300	$1,151,300	$ 938,000
Apartments	3/	126,300	129,600	139,800	181,400	181,400	145,000
Commercial	3/	128,700	128,700	128,700	128,700	128,700	128,700
Industrial	3/	205,900	205,900	205,900	205,900	205,900	205,900
Schools and Churches	3/	43,800	43,800	43,800	43,800	43,800	43,800
Other	3/	321,300	321,300	321,300	321,300	321,300	321,300
Total	3/	$1,654,500	$1,676,700	$1,747,200	$2,032,400	$2,032,400	$1,782,700

1/ The designations P-10 and Po refer to 10 years prior to the year the study was undertaken and the beginning of the evaluation period, respectively.
2/ Average Annual Equivalent
3/ Not evaluated

Table 6
Residual Flood Damages by Decade under Alternative Plans
Applicable Discount Rate: 7-7/8%

Alternative	Time Period				
	1990 (Po) 1/	2000	2030	2090	AAE 2/
Nonstructural	$1,075,400	$1,123,300	$1,317,400	$1,317,400	$1,147,000
Channel Work and Nonstructural	178,200	185,400	214,000	214,000	188,900

1/ The designation Po refers to the beginning of the evaluation period.
2/ Average Annual Equivalent

Table 7
Summary of Annualized Benefits and Costs for Alternative Plans
Applicable Discount Rate: 7-7/8%

	Alternatives	
	1	2
Flood Hazard Reduction Benefits		
Inundation		
Physical	$635,900	$1,611,200
Emergency	0	11,600
Total Benefits	$635,900	$1,622,800
Total Costs	328,800	1,262,600
Net Benefits	$307,100	$ 360,200

Biological and Visual: The study results concerning the biological and visual problems are presented in the Problem and Opportunity Identification section of the watershed plan/EIS.

Forecasting

A description of all forecasting is contained in the watershed plan/EIS under the Forecasting Conditions and Risk and Uncertainty sections of that report.

Special Considerations for Urban Damage

Because all persons may not agree with some of the assumptions used in this analysis, Table 8 was prepared to compare different benefit levels that could result should different assumptions be employed. Only those key assumptions that involve significant benefit categories are varied in the four "case" studies displayed. The assumptions for the NED Plan, the nonstructural plan, and the four "case" studies are listed following the table.

Table 8
Comparison of Sensitivity Analyses

	Channel Work and Floodproofing Alternative (NED)	Case 1	Case 2	Case 3	Case 4
Benefits (A.A.)	$1,622,800	$1,559,600	$1,545,500	$1,669,100	$1,507,600
Costs (A.A.)	1,262,600	1,262,600	1,262,600	1,262,600	1,262,600
B:C Ratio	1.3:1.0	1.2:1.0	1.2:1.0	1.3:1.0	1.2:1.0
	Nonstructural Alternative				
Benefits (A.A)	$ 635,900	$ 584,700	$ 633,300	$ 637,500	$ 595,500
Costs (A.A)	328,800	328,800	328,800	328,800	328,800
B:C Ratio	1.9:1.0	1.8:1.0	1.9:1.0	1.9:1.0	1.8:1.0

Channel Work and Floodproofing Alternative (NED Plan); Nonstructural Plan: Both plans assume that all existing structures will have the same economic value throughout the 100-year period of analysis; that 25 percent of the vehicles parked near homes in the flood plain and 100 percent parked at apartments, commercial, industrial, school, and church buildings that would normally be damaged by a flood event will be evacuated prior to receiving any damages; and the OBERS regional growth rate for per capita income is applicable for increasing the value of residential contents in the future.

Case 1: Same assuptions as listed under NED Plan except that it is assumed none of the existing buildings have any economic value 50 years into the evaluation period.

Case 2: Same assumptions as listed under NED Plan except that 50 percent of the vehicles parked near homes and 100 percent parked near apartments, commericial industrial, school, and church buildings that would normally be damaged will be evacuated prior to receiving damages.

Case 3: Same assumptions as listed under the NED Plan except that 10 percent of the vehicles parked near homes and 100 percent parked near apartments, commercial, industrial, school, and church buildings will be evacuated prior to receiving damages.

Case 4: Same assumptions as listed under the NED Plan except that the OBERS regional growth rate for per capita income is not applicable and therefore the value of residential contents was not projected to increase in the future.

It should be mentioned why no specific analyses are presented for break even years, discount rates, and value per structure. Break even years need not be displayed because both alternatives have a B:C ratio greater than one under existing conditions. No additional analysis needs to be displayed relative to a change in discount rate since the discount rate used in this study was the current applicable rate of 7-7/8 percent. No additional analysis is warranted with respect to the value of structures since no new structures were forcasted to be located in the flood plain over what exists now. Also, the value of the existing structures was not projected to increase.

The without project flood damages, including the 500-year event, and rationale for plan formulation and selection are clearly described in the watershed plan/EIS. The remaining flood damges, including the residual 500-year damages are also described in the Effects section of the that report.

Summary of Interview Surveys

Flood damage interviews were conducted with flood plain residents using OMB-approved forms (Appendix A). A summary of the responses is contained in Table 9.

Table 9 Summary of damage interview responses

INTERVIEW NUMBER	TYPE	MARKET VALUE	CONTENT VALUE	% OF CONTENT VALUE/ MARKET VALUE	1 FT. FLOODING		3 FT. FLOODING		5 FT. FLOODING	
					$	% OF CONTENT VALUE	$	% OF CONTENT VALUE	$	% OF CONTENT VALUE
1001	Residential	48000	17500	36.5	6300	36.0	8000	45.7	13000	74.3
1002	Residential	50000	20000	40.0	5900	29.5	10000	50.0	-	-
1003	Residential	68600	25000	36.4	6500	26.0	10000	40.0	20000	80.0
1004	Residential	32600	10000	30.8	2600	26.0	6000	60.0	-	-
1005	Residential	32600	15000	46.0	5000	33.3	6500	43.3	9000	60.0
1006	Residential	33800	15000	44.4	4225	28.2	6000	40.0	10000	66.7
1007	Residential	62300	25000	40.1	8100	32.4	-	-	-	-
1008	Residential	36900	16000	43.4	6500	40.1	8000	50.0	10000	62.5
1009	Residential	45300	15000	33.1	5700	38.0	8000	53.3	-	-
1010	Residential	54600	15500	28.4	5000	32.3	8000	51.6	11000	71.0
8	Banks	259600	116250	44.8	11900	10.2	73400	63.1	73400	63.1
7	Banks	230400	125000	54.3	75000	59.8	125000	100	125000	100
24	Clothing	82100	200000	244	10000	5.0	80000	40.0	160000	80.0
23	Clothing	82300	500000	608	10000	2.0	100000	20.0	500000	100
22	Clothing	300000	300000	100	100000	33.0	250000	63.0	300000	100
110	Fast Food	275000	250000	90.9	75000	30.0	150000	60.0	250000	100
111	Fast Food	24000	70000	291	30000	42.9	50000	71.4	70000	100
11	Fast Food	47600	10000	21.0	3000	30.0	7000	70.0	10000	100

Table 9 (cont.)

INTERVIEW NUMBER	TYPE	MARKET VALUE	CONTENT VALUE	% OF CONTENT VALUE/ MARKET VALUE	1 FT. FLOODING		3 FT. FLOODING		5 FT. FLOODING	
					$	% OF CONTENT VALUE	$	% OF CONTENT VALUE	$	% OF CONTENT VALUE
12	Gas Station	63500	41000	64.57	16000	39.0	-	-	-	-
40	Appliance	148300	50000	33.7	40000	80.0	50000	100	50000	100
37	Auto Parts	165000	150000	91.0	75000	50.0	120000	80.0	150000	100
39	Hardware	185400	250000	135	75000	30.0	125000	50.0	200000	80.0
42	Hardware	71100	80000	113	90000	11.0	22000	27.5	30000	37.5
43	Appliance	74600	50000	67.0	45000	90.0	47500	95.0	50000	100
44	Appliance	102200	25000	24.5	25000	100	25000	100	25000	100
45	Hardware	79600	250000	314	50000	20.0	175000	70.0	200000	80.0
46	Hardware	80000	25000	31.3	20000	80.0	22500	90.0	25000	100
14	Hardware	130000	150000	115	75000	50.0	150000	100	150000	100
41	Hardware	30900	450000	1456	45000	10.0	360000	80.0	450000	100
29	Hardware	69300	30000	43.3	22500	75.0	30000	100	30000	100
88	1/	1150000	500000	43.5	450000	90.0	470000	94.0	500000	100
461	1/	482100	185000	38.8	10000	28.6	25000	71.4	35000	100
16	Restaurant	72700	60000	82.5	11000	18.3	15000	25.0	-	-
9	Restaurant	85000	50000	58.8	93000	18.6	11300	22.6	50000	100
10	Restaurant	84000	42000	50.0	15500	36.9	15500	36.9	35000	83.3
91	Retail	61800	5000	8.1	1500	30.0	5000	100	5000	100

Table 9 (cont.)

INTERVIEW NUMBER	TYPE	MARKET VALUE	CONTENT VALUE	% OF CONTENT VALUE/ MARKET VALUE	1 FT. FLOODING		3 FT. FLOODING		5 FT. FLOODING	
					$	% OF CONTENT VALUE	$	% OF CONTENT VALUE	$	% OF CONTENT VALUE
12	Fast Food	43100	35000	81.21	1750	5	10500	30.0	35000	100
450	Fast Food	300000	285000	95.0	5000	1.8	100000	35.1	285000	100
10	Fast Food	15000	25000	166	13700	54.8	20000	80.0	25000	100
13	Food Market	81500	25000	30.7	5000	20.0	15000	60.0	25000	100
15	Food Market	81400	80000	98.3	3000	3.75	80000	100	80000	100
451	Food Market	80000	200000	250	60000	30.0	100000	60.0	200000	100
401	Food Market	92000	87000	94.6	13200	15.2	17600	20.2	22000	25.3
402	Food Market	64300	50000	77.8	7000	14.0	28000	56.0	46000	92.0
36	Food Market	77900	275000	353	11000	4.0	275000	100	275000	100
18	1/	409200	250000	61.1	70000	28.0	110000	44.0	225000	90.0
480	1/	181500	100000	55.1	10000	10.0	20000	20.0	25000	25.0
481	1/	42600	200000	469	45000	22.5	100000	50.0	160000	80.0
18	Furniture	323400	150000	46.38	127500	85.0	127500	85.0	127500	85.0
16	Furniture	281500	100000	35.6	50000	50.0	100000	100	100000	100
17	Furniture	231000	70000	30.3	70000	100	70000	100	70000	100
14	1/	0	500000		100000	20.0	500000	100	500000	100
14A	1/	0	200000		75000	37.5	200000	100	200000	100
13	Gas Station	73800	55000	74.53	15000	27.0	-	-	-	-

Table 9 (cont.)

INTERVIEW NUMBER	TYPE	MARKET VALUE	CONTENT VALUE	% OF CONTENT VALUE/ MARKET VALUE	1 FT. FLOODING		3 FT. FLOODING		5 FT. FLOODING	
					$	% OF CONTENT VALUE	$	% OF CONTENT VALUE	$	% OF CONTENT VALUE
92	Retail	75000	300000	400	15000	5.0	50000	16.7	150000	50.0
93	Retail	60000	5000	8.3	-	-	-	-	-	-
94	Retail	109375	25000	22.9	15000	60.0	20000	80.0	25000	100
35	Retail	92700	100000	108	60000	60.0	10000	100	100000	100
34	Retail	92700	150000	162	15000	10.0	75000	50.0	150000	100
33	Retail	92700	100000	22.9	10000	10.0	25000	25.0	50000	50.0
32	Retail	30900	22500	72.8	5000	22.2	17500	77.8	22500	100
31	Retail	27800	10000	35.9	5000	50.0	10000	100	10000	100
28	Retail	24700	9000	36.4	1800	20.0	4500	50.0	9000	100
27	Retail	139000	210000	141	1000	1.0	11000	52.3	200000	95.0
26	Retail	88400	10000	11.3	5000	50.0	10000	100	10000	100
25	Retail	85000	20000	23.5	5000	25.0	15000	75.0	20000	100
980	Retail	198000	110000	55.6	40000	36.0	60000	54.5	110000	100
75	Industrial	591700	500000	84.6	200000	40.0	250000	50.0	-	-
71	Industrial	104200	75000	71.9	10000	13.3	10000	13.3	10000	13.3
72	Industrial	32300	100000	309.6	70000	70.0	75000	75.0	75000	75.0
73	Industrial	156300	50000	32	50000	100	50000	100	50000	100
74	Industrial	-	850000	-	25000	2.9	850000	100	850000	100

Table 9 (cont.)

INTERVIEW NUMBER	TYPE	MARKET VALUE	CONTENT VALUE	% OF CONTENT VALUE/ MARKET VALUE	1 FT. FLOODING		3 FT. FLOODING		5 FT. FLOODING	
					$	% OF CONTENT VALUE	$	% OF CONTENT VALUE	$	% OF CONTENT VALUE
76	Industrial	5350000	2675800	49.9	107000	4.0	224800	8.4	371900	13.9
77	Industrial	2689700	2500000	92.9	400000	16.0	1000000	40.0	1500000	60.0
78	Industrial	796400	1500000	188	300000	20.0	400000	30.0	600000	40.0
79	Industrial	244600	300000	122.6	70000	23.0	95000	31.6	120000	40.0
80	Industrial	1105100	500000	45.2	62000	12.4	125000	25.0	186000	37.2
84	Industrial	3690000	8000000	210	300000	3.7	800000	10.0	1750000	65.6
15	1/	1680000	1000000	59.5	170000	17.0	370000	37.0	-	-

1/ TYPE WITHHELD TO INSURE PRIVACY

Costs

Construction costs for the NED Plan were based on the most recent bids on projects installed under PL-566 for similar situations. Unit costs were developed by excluding the high and low bidders and averaging the remaining bids. Costs over 6 months old were brought to present value using the Engineering News Report construction cost index.

Engineering and mitigation costs were estimated by SCS based on past experiences with recent urban projects.

Land rights costs were developed by SCS using data supplied by SCVWD on flood control projects recently completed in the area. The costs were updated if necessary and reviewed by the SCVWD.

Tables 10 and 11 summarize the total project investment and annualized costs of the NED plan. A more detailed breakdown of costs appears in the Recommended Plan section of the watershed plan/EIS.

Table 10
Project Investment

1.	Construction Cost	$ 8,903,000
2.	Construction Contingency	1,356,000
3.	Engineering	624,000
4.	Project Administration	1,288,000
5.	Wildlife and Visual Mitigation	144,000
6.	Land rights costs	1,639,000
7.	Interest during installation at rate of 7-7/8%	1,245,000
	Total Investment	$15,199,000

Price level 1982
Period of analysis--100 years

Table 11
Annualized Adverse Effects
1982 Prices, 100-year Evaluation Period,
7-7/8% Interest Rate

Interest during installation	$ 98,100
Amortization of Investment	1,099,400
Average Annual Operation and Maintenance	65,100
Total Annualized Adverse Effects	$1,262,600

Representatives of SCVWD, the agency responsible for flood control in Santa Clara County, furnished information on operation and maintenance (O&M) costs for similar size and types of channels they maintain. These costs were used by the SCS engineer in calculating O&M costs for the channel in the NED plan. The O&M costs for mitigation were based on SCS experience in other watershed projects. O&M costs for the nonstructural measures are based on replacing

floodshields at 20-year intervals and reapplying waterproof sealant to the concrete walls at 5-year intervals. These were discounted to present value and amortized for the life of the project. Since there were only two structures involved the inspection time and overhead costs are negligible.

Average annual costs were derived by amortizing the $13,954,000 total installation cost over a 100-year period at 7-7/8 percent interest. The average annual cost of O&M and interest during installation were added to the amortized installation cost to determine the total average annual cost of the NED Plan.

The interest during the four years of installation was calculated using 7-7/8 percent interest. From the schedule of construction costs presented in the watershed plan/EIS, interest was calculated from the year construction funds were spent to the beginning of the project evaluation period. For instance, during the first year of the construction schedule (1986), interest was calculated on funds spent during that year for the three remaining years up to the beginning of the evaluation period (1990). Interest was calculated on construction funds spent the second and third year in a similar manner. Annualized interest expense was calculated to be $98,100.

Benefits

There are five categories of damage reduction benefits and one savings in future costs category. The following pages describe the source of the base data and the procedures used to evaluate problems and benefits for each of the categories.

1. Reduction of damages to buildings and structures:

Source of base data: The number and location of structures were obtained from a detailed inventory of the flood plain done at the beginning of the study. Because of the large number of structures located in the flood plain (3,787), a representive sample of 1,331 (35%) was developed and used to evaluate the with and without project damages and resulting benefits. The market value of structures was obtained from realtors, utilization of the Marshall Swift Appraisal System, and interviews with flood plain residents. Content values were obtained from field interviews. Damage schedules were developed primarily through interviews with flood plain residents. They were supplemented by Flood Insurance Administration data and data contained in the Stanford Research Institute report outlining procedures in estimating flood damages to residential, commercial, and industrial properties in California. First floor, ground, and curb elevations were obtained by engineering field surveys of the individual properties involved.

Procedures: The type, location, market value, content value, first floor elevation, and damage schedules were combined with hydrologic and hydrology data in the Urban 1 computer program to obtain future without damages and residual damages under various alternatives. Five different storm frequencies were analyzed. From these storms an average annual value was obtained. The difference between the future without and future with alternatives was claimed as benefits. The OBERS regional growth rate for per capita income was used to increase the damageable value of residential contents in the future and therefore the resulting benefits attributed to each alternative.

2. Reduction of damages to automobiles:

Source of base data: The number, location, and age of a representative sample of vechicles were determined by inventorying the flood plain. The value of the vehicles was determined by using the average value contained in the Kelly Blue Book. Damage schedules were developed through interviews with flood plain residents and with insurance companies having experience with flooded automobile claims. The City of San Jose Police Department was contacted to assist in determining the potential for evacuating automobiles during a flood. The department had recently provided emergency assistance during the spring, 1982 floods in the area.

An estimate of the percentage of vehicles likely to be safely evacuated was developed by drawing on this past flooding experience and examining characteristics of the Lower Silver Creek Watershed. The most important characteristics were (1) the high concentration of people, (2) the number of road closures likely to occur during a flood, and (3) the relatively short amount of time to warn residents of impending danger.

Procedures: The data obtained during the field inventory was used to determine the value of vehicles. This value was adjusted to reflect the probability of the vechile being parked at a residence during a flood event. This was done by comparing an inventory of vehicles parked in the flood plain during working hours and an inventory of vehicles parked in the flood plain during non-working hours. This comparison was then weighted based on the assumption that there is an equal probability of any given storm occurring at any time on any given day of the week. After

this adjustment was made, the data (location, type of vehicle, their value, elevations, and damage factors), along with hydrologic and hydrology data, were entered into the SCS Urban 1 computer model to obtain future without project damages and residual damages under the various alternatives. Five different storm frequencies were analyzed. From these an average annual value was obtained. The resulting values were reduced by 25 percent to account for the number of vehicles parked at residences in the flood plain during a flood event that could, theoretically, be evacuated from the flood plain without being damaged.

The elevations used in this evaluation were derived from a combination of the observed locations of vehicles and the house surveys taken. For instance, if a vehicle was parked in the garage during the inventory stage, the ground elevation in front of the residence was used. Damages would not begin until water is at least 12 inches above this elevation.

Vehicles parked at apartment, commercial, industrial, church, and school buildings were not evaluated as a part of this study. Content values of the vehicles evaluated were assumed to be zero. No projections were made.

3. Reduction in traffic disruptions:

Source of base data: The City of San Jose furnished the data on vehicle trips relating to the nine major roadways impacted by flooding. The city also furnished the types of vehicles, detour routes, time delay estimates, and criteria for road closures. A value of .20¢/mile was used for extra costs resulting from detouring around the flood plain. This value was

obtained from the Internal Revenue Service. Monetary values for extra wages were determined by SCS using the average wage scale for truckers in the area ($13.48/hour) obtained from the Employee Development Department, State of California.

Procedures: Working with the City of San Jose, the total number of vehicle trips were determined for each of the nine flooded roadways. This value was adjusted to reflect the estimated length of time the roadway would be closed as well as the time of day it would be closed. This was accomplished using hydrology data furnished by the SCS hydrologist. This procedure yielded a total number of vehicle trips that would be impacted (require rerouting). The city developed a scheme of re-routing the traffic which, combined with the number of vehicles involved, yielded the total number of vehicle miles required to circumvent the flood plain. A value of .20¢/mile was used to obtain an estimate of the extra operating expenses to drivers resulting from a flood event.

Extra wages which would result from delays due to road closures was calculated for commerical truck drivers only. It was assumed that other workers would still be paid by their employer or be put on some form of paid leave status. The city furnished SCS with a breakdown of trucks versus automobiles on the roadways. Using this percentage, the number of truck trips was determined. It was conservatively estimated by SCS and the city that each rerouted vehicle trip would result in a 30-minute delay. This delay multiplied by the number of truck trips multiplied by $13.48/hour served as an estimate of the extra wages paid to truckers during a flood event.

The extra operating expenses described above plus the extra wages to truck drivers yielded total losses (damages) attributed to traffic disruptions for a specific storm event. Three storm events were analyzed to determine an average annual value.

The same procedures were followed to determine residual damages under the various alternatives. The difference resulted in the benefits claimed.

4. Reduction in sediment deposition clean-up costs on roadways:

Source of base data: The SCS geologist estimated the amount of sediment involved. Dollar estimates for removing sediment from roadways was obtained by working with the City of San Jose, who would be responsible for clean-up operations. A spring, 1982, flood in the area provided the basis for their estimates.

Procedures: Standard procedures in TR-51, TR-52, Geology Note 2, and Section 3 of the National Engineering Handbook were used to estimate erosion rates and sediment yield. Sediment was routed through the watershed manually (generating sediment above the debris basins, subtracting sediment due to deposition in basins, delivering to and diverting into Lake Cunningham, delivering to and diverting onto the flood plain, and deliverying to Coyote Creek). This routing was done for various storm frequencies and an average annual value was calculated. Flood plain sediment deposition (depth and areas where deposition would occur) was given to the City of San Jose engineers. Based on prior experience they estimated clean-up costs for two storm frequencies.

The same procedures were used to calculate future with project conditions. The difference between the costs were claimed as benefits.

5. Reduction in emergency services costs:

Source of base data: Basic data was obtained through interviews with the San Jose Office of Emergency Services, the Red Cross, and the San Jose Police Department. A considerable amount of data was available from the spring, 1982 recent flood in the area.

Procedures: The first step in the analysis was to determine the total number of people requiring evacuation assistance and congregate care. Based on past flood experience, the Red Cross estimated that 20 percent (2,900) of the 14,400 flood plain residents would require emergency assistance during a 100-year flood event.

According to interviews, the main expense items for evacuating residents, providing congregate care, and securing the area were:

1. Cost of getting people to shelters.
2. Cost of operating emergency shelters.
3. Cost of supplying extra police and fire protection.

Summing these costs yielded an estimated cost for the 100-year event. The same procedure was used for two other storm events and an average annual value was attained.

The with project scenario was then evaluated. The residual flood plain served as a basis for determining the total number of people and adjusted by the 20 percent factor to attain the number of people requiring assistance. Total expenses were then caluculated. The difference between the without and with project conditions were claimed as benefits.

6. Savings in future costs:

Source of base data: Using the inventory of structures as a base, interviews with the local flood control agency indicated that the average house turnover rate in the area is seven years and that FIA regulations are already in effect. Therefore, it was assumed that by 1990 all residential homes would be insured. An estimate of $25 for administrative costs per policy was obtained form the Federal Emergency Management Agency (FEMA).

Procedures: The number of houses flooded at the 100-year event was calculated from the output of the Urban 1 computer runs for the without project and with project alternatives. The difference between the two multiplied by a savings of $25 per policy provided the estimate of average annual benefits. The $25 per policy represents the savings that FEMA will realize by no longer having to issue flood insurance policies.

Environmental Quality

The biological and wetland resources within the watershed were inventoried using USGS topographic maps, USFWS wetland maps, aerial photos, the County General Plan (1980), California Department of Fish and Game records, and field surveys. This information was used to produce a habitat map for the watershed.

The California Natural Diversity Data Base, California Department of Fish and Game, USFWS, and San Jose State University, were contacted for information in preparing the endangered and threatened species biological assessment.

The local sponsor, SCVWD, conducted a biological resource survey during preparation of their 1978 environmental impact report for the project. Information from this report was also used in the assessment of biological resources.

Standard procedures in TR-65 were used by the landscape architect in evaluating the visual resources along the channel and in determining landscape needs.

Mitigation needs were determined using the evaluation procedures described in the Procedure used to Measure Economic and Environmental Values for With Project Conditions for each Alternative section of this report. The results of the evaluation showed a net decrease of 4.3 HU's with installation of the NED Plan (Table 12).

Table 12
Habitat Evaluation of NED Plan

	Wetlands		Riparian	
	Acres	HU's	Acres	HU's
Without Project	8.5	5.4	29.5	9.4
NED Plan	17.4	4.4	24.9	6.1
Net Difference	+8.9	-1.0	-4.6	-3.3

It was determined by the SCS biologist that 6.4 acres of mitigation plantings would be required to compensate for the 4.3 HU's removed should the NED Plan be installed.

The significant EQ effects of the NED Plan are shown in Appendix C--Display of Principles and Standards Accounts For Recommended Plan in the watershed plan/EIS.

Cost Allocation

This is a single purpose, flood prevention project and therefore, all costs are allocated to flood prevention.

Cost Sharing

This NED Plan has structural and nonstructural elements. Cost sharing for the structural element followed the policies and procedures outlined in the National Watersheds Manual Part 506, Subpart G, Cost Sharing. PL-566 funds will pay 100 percent of Engineering Services, construction costs, and SCS administrative costs. The sponsors will pay 100 percent of landrights and their administrative costs.

The nonstructural elements will be cost shared in accordance with the policies and procedures outlined in National Watersheds Manual Part 505, Subpart B. The local share for the installation of this element is 20 percent of the composite of construction, engineering, and project administration. This amounts to 20 percent of construction costs and all of the project administration costs. PL-566 funds will pay 80 percent of the composite, which amounts to 80 percent of construction costs and all of the engineering costs.

Appendix A

Sample OMB Interview Forms

FORM APPROVED
OMB NO. 40-R3805
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SCS-WS-2
4-77
FILE CODE WS-14

FLOOD DAMAGE – RESIDENTIAL PROPERTIES

This report is authorized by law (PL-83-566). While you are not required to respond, your cooperation is needed to make the results of this survey comprehensive, accurate and timely.

SAMPLE FORM

Watershed _____ State _____

Reach _____ Interviewer _____ Date _____

Occupant _____

Address _____ Years lived here _____

Times residence flooded: No. _____ Dates _____

Date of specific flood event _____ Hrs. of advance warning received _____

Depth of water in basement _____

Describe source of floodwater (through windows, walls, basement drains, etc.)

Depth of water on or above first floor _____

Depth of water on grounds or lawn _____

Depth of water in garage _____

Depth of water in other buildings _____

Depth of water in automobiles _____

Location of automobiles when flooded

Depth below the above flood at which damages begin _____

FLOOD DAMAGE--COMMERCIAL--INDUSTRIAL

SAMPLE FORM

Watershed _____ State _____ Reach _____

Interviewer _____ Date _____

Type of Business _____ Address _____ Owner _____

Structure:

Construction: Frame ☐ Brick ☐ Metal ☐ Other (specify) _____

Market Value (do not include land) $ _____

Size: Basement _____ sq. ft. 1st Floor _____ sq. ft. No. of Floors _____

Value of Contents: (estimated) Basement $ _____ 1st Floor $ _____ 2nd Floor $ _____
Other $ _____

1st Floor Storage (per cent stored in relation to elevation):

0.0 - 1.0 ft. _____ % 1.1 - 3.0 ft. _____ % 3.1 - 5.0 ft. _____ % 5.1 ft. and over _____ %

Number of Employees _____ How Often Do Damaging Floods Occur? _____

Date of Flood _____ Type of Flood: Backwater ☐ Flowing ☐

Depth of Flood: Grounds _____ ft. Basement _____ ft. 1st floor _____ ft. 2nd Floor _____ f

	Estimated Damages (Dollars)			Remarks
Grounds -- Parking lots, walks, signs	XXX	XXX	$	(Loss prevented by evacuation, emergency preparations, etc.)
Lawns, shrubs	XXX	XXX		
Structure -- Foundation	XXX	XXX		
Walls	XXX	XXX		
Other	XXX	XXX		
Contents -- (Stock)	Basement	1st Floor	Other	
Merchandise	$	$	$	
Equipment				
Records				
Misc. (specify) _____				
Other -- Loss of Business	XXX	XXX	$	
Evacuation-Reoccupation	XXX	XXX		
Flood proofing	XXX	XXX		
Employee Wages Lost	XXX	XXX		
Misc.	XXX	XXX		
Totals	$	$	$	
TOTAL LOSS FOR FLOOD			$ _____	

Estimated Damages at Higher or Lower Stages Than This Flood

Higher 1' $ _____ 2' $ _____ 3' $ _____ 4' $ _____ 5' $ _____

Lower 1' $ _____ 2' $ _____ 3' $ _____ 4' $ _____ 5' $ _____

Appendix B

Summary of the Scaling Process for Plans 1 and 2

Plan 1--Nonstructural Plan 1/

Level of Protection	Benefits	(Increase in Benefits)	Costs	(Increase in Cost)	Total Net Benefits	(Increase in Net Benefits)
10-year	$ 102,200		$ 80,300		$ 21,900	
		$381,800		$127,600		$254,200
25-year	484,000		207,900		276,100	
		151,900		100,000		51,900
50-year	635,900		307,900		328,000	

Plan 2--Channel Enlargement Plan (Without Nonstructural Increment) 1/

Level of Protection	Benefits	(Increase in Benefits)	Costs	(Increase in Cost)	Total Net Benefits	(Increase in Net Benefits)
25-year	$1,145,300		$ 883,400		$261,900	
		$320,300		$183,500		$136,800
50-year	1,165,600		1,066,900		398,700	
		154,000		96,400		57,600
100-year	1,619,600		1,163,300		456,300	

1/ Costs shown do not include interest during construction.